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AT THE SHOW

cippe 2023

CNOOC Ltd unlocking South China Sea riches

CNOOC Ltd boosts capex budget and eyes gas production hub in South China Sea. **Pages 2&3**

中国海油最近在南海的琼东南和莺歌海盆地发现了大量天然气，准备在那里建设一个天然气生产中心。

P2&3

The deep-water semi-submersible Shen Hai Yi Hao at the Lingshui 17-2 gas field in the South China Sea
Photo: CHINA CLASSIFICATION SOCIETY

Boom times on horizon for China's Bohai Bay

渤海湾已成为中国海上油气产量增长主力 Page 4

Chinese yards swamped with FPSO orders

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OFFSHORE

Unlocking the South China Sea's gas riches

CNOOC Ltd boosts capex budget by 13% and gears up for first production from nine domestic and international fields in 2023

XU YIHE
Houston

CHINESE offshore operator CNOOC Ltd's significant investments in exploration in recent years are paying off as offshore fields last year provided 60% of the country's total oil and gas production increase.

Recent offshore exploration has turned up massive gas discoveries in the Qiongdongnan and Yinggehai basins of the South China Sea, where CNOOC Ltd is set to build a gas production hub.

In the South China Sea's Pearl River Mouth basin, the company is looking to redevelop mature fields and bring marginal finds together in "cluster" developments.

Bohai Bay in northern China has emerged as the pearl of the country's offshore oil and gas production, with output last year hitting 34.5 million tonnes (256 million barrels) of oil equivalent, a record high.

An ambitious plan calls for CNOOC Ltd to boost Bohai's output to 294 million boe by 2025. Current Bohai activity centres around the giant Bozhong 19-6 development.

CNOOC Ltd never updates its E&P activities in the East China Sea, where Japan claims partial sovereignty.

CNOOC Ltd chairman Wang Dongjin said ongoing South China Sea exploration has so far revealed an estimated 800 billion cubic metres of natural gas reserves, giving the company the confidence to project annual gas production will increase to 35 Bcm by 2025 and further to 45 Bcm by 2035.

The 2025 gas target will almost triple CNOOC Ltd's domestic gas output, which hit 13.5 Bcm last year, and account for up to 35% of its oil and gas production mix.

The Chinese government has confirmed that CNOOC Ltd's recent Baodao 21-1 deep-water gas discovery in the Qiongdongnan basin holds up to 50 Bcm of proven gas in place and 3 million cubic metres of condensate.

CNOOC Ltd has yet to reveal a development scheme at Baodao, although sources have suggested deploying a semi-submersible production unit tied back to a subsea production system, similar to the Lingshui gas development in the same sea area.

Baodao 21-1 lies in water depths between 660 and 1570 metres and is part of the Paleogene Lingshui formation, known for its gas condensate reservoirs.

The discovery well encountered 113 metres of pay when drilling reached 5188 metres.

For 2023, CNOOC Ltd has increased its capital expenditure budget by 13% to between 100 billion yuan and 110 billion yuan (between $14.5 billion and $16 billion), with exploration, field development and production spending to account for 18%, 59% and 21%, respectively.

The company's net production is targeted at between 650 million and 660 million boe for the entire year, up from the estimated 610 million boe in 2022.

Last year, CNOOC Ltd produced 340 million boe from overseas fields, up by 51 million boe from 2021, of which 294 million boe was crude, up 18% year on year.

Offshore China — including equity oil and gas for CNOOC Ltd's production equity partners — produced 382 million barrels of crude and 25.3 Bcm of natural gas last year.

Of the total crude production, 233 million barrels came from Bohai Bay and 145 million barrels from the South China Sea.

Domestic production accounts for about 70% of the total, but a ramp-up of oil and gas fields on the ExxonMobil-operated Stabroek block offshore Guyana has lifted overseas production to 30% of the total.

In 2023, the company will bring online nine oil and gas projects, including phase one of the giant Bozhong 19-6 gas condensate field in Bohai Bay, the Lufeng 12-3 and Enping 18-6 oilfields in the South China Sea, as well as the Payara field in Guyana, and Buzios 5 and Mero 2 in Brazil.

One of the key offshore projects under development is the Lingshui 25-1 deep-water gas field, where a 12-well drilling campaign is under way.

The 12 subsea trees will be provided by US contractor Baker Hughes, which will lease a workshop in Chengmai County in Hainan province for assembly.

Lingshui 25-1 foresees annual production of 1.5 Bcm at peak. Lingshui 17-2 and Lingshui 25-1 together hold 150 Bcm of recoverable gas reserves. Discovered in 2015 and located in the north of the Ledong trough in average water depths of 980 metres, the Lingshui 25-1 development lies 132 kilometres northwest of Hainan province.

CNOOC Ltd hopes to achieve peak carbon emissions in 2028, two years ahead of the government's target, and carbon neutrality in 2050.

The company has increased efforts to tap carbon capture and storage (CCS) technology for enhanced oil recovery in Beibu Gulf fields.

One of the schemes is to capture carbon dioxide emitted from the Datang Leizhou power plant and inject it into reservoirs at the Wushi oilfield currently under development in the Beibu Gulf, which will be able to store 15 million tonnes of carbon dioxide and boost oil recovery by almost 15 million barrels.

CNOOC Ltd has already commissioned China's first offshore CCS project at its Enping 15-1 oilfield. The project can capture and reinject up to 300,000 tonnes per annum of CO_2.

The company aims to store up to 1.46 million tonnes of CO_2 over the life of the field. CNOOC Lts

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Confident projections: CNOOC Ltd chairman Wang Dongjin.
Photo: CNOOC LTD

also aims to use its oil and gas expertise to develop large-scale offshore wind projects.

It has signed an agreement with US independent ConocoPhillips to develop an offshore wind farm to supply green power for oil production at the Penglai oilfield in Bohai Bay.

With four wind turbines and total installed capacity of 34 megawatts, the partners say the wind farm will tie back to the existing central processing platform via subsea cables, distributing energy to the field's power grid.

At full capacity, the wind farm will have the potential to meet more than 30% of the power needed for Penglai's operations, according to the operator.

Production pearl: the Baodao gas discovery in the South China Sea.
Photo: CNOOC LTD

中海油不断挖掘南中国海天然气潜力

中海油近年来在勘探方面的重大投资正在取得回报，去年公司贡献了中国石油和天然气总产量增长的60%。

公司最近在南海的琼东南和莺歌海盆地发现了大量天然气，准备在那里建设一个天然气生产中心。

在珠江口盆地，该公司正在寻求重新开发成熟油田，并将边际发现连片开发。同时，渤海湾已成为中国海上油气生产的明珠，去年产量达到3450万吨（2.56 亿桶）油当量，创历史新高。

根据计划，中海油到2025年将渤海的产量提高到2.94亿桶油当量。渤海目前的活动围绕着巨大的渤中19–6开发展开。

中海油整体规划显示，到2025年，我国南海的莺歌海、琼东南及珠江口三个盆地总体探明天然气储量可达1万亿立方米，建成“万亿方大气区”，通过已建成的“崖城–香港”海底输气主管线，海底的优质清洁能源将直通粤港澳大湾区和海南岛，为区域建设和能源结构转型提供坚强保障。

中海油董事长王东进表示，正在进行的南海勘探迄今已发现约8000亿立方米的天然气储量，这让该公司有信心预计到2025年天然气产量将增加到350亿立方米，到2035年进一步增加到450亿立方米。

2025年的天然气目标将使中海油的国内天然气产量增加近三倍，去年中国天然气产量达到135亿立方米，占其石油和天然气生产组合的 35%。

中国政府已证实，中海油最近在南海琼东南盆地发现的宝岛21–1深水天然气发现储量高达500亿立方米和凝析油储量300万立方米。宝岛21–1水深660～1570米，为古近系陵水组的一部分。

2023年，中海油将资本支出预算增加了13%，达到1000亿元人民币至1100亿元人民币（145亿美元至160亿美元），其中勘探、油田开发和生产支出分别占18%、59%和21%。全年净产量目标在6.5亿至6.6亿桶油当量之间，高于2022年估计的6.1亿桶油当量。

去年，中海油从海外油田生产3.4亿桶油当量，较2021年增加5100万桶油当量，其中原油2.94亿桶油当量，同比增长18%。国内产量约占总产量的70%，但埃克森美孚运营的圭亚那近海Stabroek区块油气田的增产已将海外产量提升至总产量的30%。

2023年，公司将投产渤海湾渤中19–6凝析气田一期、南海陆丰12–3、恩平18–6油田等9个油气项目。圭亚那的

Payara和巴西的Buzios 5和Mero 2国际油田。开发重点海上项目之一是陵水25–1深水气田。

陵水25–1预计高峰期年产量为15亿立方米。陵水17–2和陵水25–1合计拥有1500亿立方米的可采天然气储量。陵水25–1开发区位于海南省西北132公里处，于2015年发现，平均水深980米。

中海油希望在2028年实现碳排放峰值，比政府的目标提前两年，并在2050年实现碳中和。公司加大力度利用碳捕集与封存 (CCS) 技术提高北部湾油田的石油采收率。

公司已经在其恩平15–1油田投产了中国首个海上CCS项目。该项目每年可捕获和再注入多达300,000吨二氧化碳。该公司的目标是在油田的整个生命周期内封存多达146万吨二氧化碳。

同时，公司还在开发大型海上风电项目。它已与总部位于休斯顿的独立康菲石油公司签署协议，开发海上风电场，为渤海湾蓬莱油田的石油生产提供绿色电力。

合作伙伴表示，该风电场拥有四台风力涡轮机，总装机容量为34兆瓦，将通过海底电缆连接到现有的中央处理平台，将能源分配到现场的电网。

据运营商称，在满负荷运行时，风电场将有可能满足蓬莱运营所需电力的30%以上。

OFFSHORE

Development: A shallow-water production system in service at Bohai Bay. Photo: CNOOC LTD

Boom times on horizon for China's Bohai Bay

Oil-rich basin has overtaken onshore Daqing as the country's largest oilfield

XU YIHE
Houston

BOHAI Bay offshore northern China has emerged as a bulwark in the country's effort to prevent oil and gas production from depleting too quickly.

Offshore output was responsible for 60% of China's hydrocarbon production increase in 2022, with the bulk of the increase coming from Bohai Bay.

The sea area holds 4.4 billion tonnes (about 32.3 billion barrels) of potential oil reserves and 500 billion cubic metres of gas in place.

Chinse offshore giant CNOOC Ltd operates dozens of fields at Bohai Bay with total acreage of 77,000 square kilometres.

Last year, the copmpany produced 233 million barrels of crude from Bohai, making it the country's largest oilfield, outperforming the flagship onshore giant Daqing. Plans call for the company to raise production to 294 million barrels by 2025.

Two commercial discoveries were made at Bohai Bay last year. Bozhong 26-6 has about 367 million barrels of oil equivalent in place, while Bozhong 19-2 has an estimated 441 million boe in reserves.

In 2022, CNOOC Ltd started development of the Bozhong 19-6 gas field, which it claims to be China's largest offshore gas discovery.

The first stage of the three-phase development of the shallow-water Bozhong 19-6 gas field covers three unmanned offshore wellhead platforms — BZ19-6WHPM, BZ19-6WHPB and BZ19-6WHPC — in addition to a central equipment platform, BZ19-6CEPA. Initial development plans call for 64 production wells and one water well. Another 23 wells will be drilled later.

The condensate will be uploaded to the Hai Yang Shi You 113 floating production, storage and offloading vessel, already serving other fields in Bohai Bay.

Gas will be treated at an onshore terminal in Binzhou city, Shandong province, which will be linked with a 46-kilometre onshore pipeline.

The company aims to produce 3 Bcm of gas and 3 million tonnes of condensate per annum from up to 20 platforms and 300 production wells when the third phase is completed in 2025.

Two more central equipment platforms will be installed in the second and third development phases. The project will cost about 15.05 billion yuan ($2.4 billion).

At Bohai Bay, CNOOC Ltd now prefers a development scheme using shallow-water subsea production systems linked with new or existing central equipment platforms.

There are more than 10 blocks at Bohai Bay with proven oil and gas reserves that cannot currently be developed because of the overlapping economic activities in the maritime area, according to Yu Guimin, a vice president of the CNOOC Tianjin business unit.

Yu says CNOOC Ltd can potentially unlock 700 million tonnes of proven reserves using its subsea development strategy, which will help the company achieve its target to produce 294 million boe per annum in the Bohai Bay area by 2025.

渤海湾已成为中国海上油气产量增长主力

渤海湾已成为中国防止石油和天然气产量过快枯竭的堡垒。2022年中国油气产量增长的60%来自海上，其中大部分增长来自渤海湾。

该海域拥有44亿吨（约323亿桶）潜在石油储量和5000亿立方米天然气储量。中海油在渤海湾经营着数十个油田，总面积达 77,000 平方公里。

去年，中海油从渤海生产了 2.33 亿桶原油，使其成为中国最大的油田，表现优于陆上旗舰巨头大庆。计划要求该公司到 2025 年将产量提高到 2.94 亿桶。

去年在渤海湾取得了两个商业发现。渤中26–6的储量约为3.67亿桶油当量，而渤中19–2的储量估计为4.41亿桶油当量。

2022年，中海油开始开发渤中 19–6 气田，据称这是中国最大的海上天然气发现。

渤中19–6浅水气田三期开发一期包括BZ19–6WHPM、BZ19–6WHPB和BZ19–6WHPC三个无人海上井口平台，以及BZ19–6CEPA中央设备平台。初步开发计划需要 64 口生产井和一口水井。稍后将钻探另外 23 口井。

该公司的目标是在2025年第三阶段完成时，从多达20个平台和300口生产井每年生产30亿立方米的天然气和300万吨凝析油。

二期、三期将再安装两台中央设备平台。该项目将耗资约150.5 亿元人民币（24亿美元）。

在渤海湾，中海油现在更倾向于使用与新的或现有的油气设施链接浅水海底生产系统的开发方案。

据中海油天津业务部副总裁于贵民介绍，渤海湾有10多个已探明油气储量的区块，由于海域经济活动重叠，目前无法开发。

他说，中海油利用其海底开发战略有可能释放7亿吨探明储量，这将有助于该公司实现到2025 年在渤海湾地区每年生产2.94亿桶油当量的目标。

cippe 北京石油展

THURSDAY 1 JUNE 2023

The editorial content of this section, pages 5 to 10, is the sole responsibility of cippe's organisers

CPET's magnetic guidance drilling technology and tools win cippe 2023 gold innovation award

The 23rd China International Petroleum and Petrochemical Technology and Equipment Exhibition (cippe) was held in Beijing as scheduled.

The organizing committee selected MGD Magnetic Guidance Drilling Technology and Tools to be the winner of the cippe Gold Innovation Award from nearly 1800 exhibitors.

MGD is high-precision wellbore trajectory positioning technology with complete intellectual property rights co-developed by CNPC Engineering Technology Research Institute Company Limited and six domestic organizations.

This technology primarily involves real-time acquisition of the artificial magnetic field distribution characteristics generated by rotating permanent magnets, alternating currents, and magnetic casings thousands of meters underground.

By combining the principles of magnetic guidance and creating a theoretical model, it navigates to position the offset wellbore at centimetre level.

The technical difficulty and accuracy of detection and interception thousands of metres underground are comparable to that of docking the space stations.

Based on MGD technology and its associated tools, 33 patents and five software copyrights have been authorized, 27 papers and four monographs have been published, and five technical specifications have been developed and published.

The core assets have won nine provincial and ministerial awards.

Through the review and appraisal of the academician and expert group of the China Petroleum and Chemical Industry Federation, the whole achievement has reached an internationally advanced level, with the key technical indicators in a leading position.

The MGD technology research and development team has been a leading innovator in the development of domestic magnetic guidance technology innovation and setting technical standards and specifications.

The MGD technology research and development team is dedicated to the fundamental innovation of high-precision magnetic steering applications, the iterative upgrading of downhole tools, and subsurface targeting well functions in multiple fields, including underground gas storage and geothermal wells.

The team has succeeded in sealing the roof of complex well construction such as underground gas storage, U-type wells and major engineering challenges, such as trenchless laying of oil and gas pipelines etc.

There is also the transition from "blind drilling" to "target drilling" with significant economic benefits and social benefits.

MGD technology has been applied to more than 364 operations in the fields of coalbed methane, geothermal energy, heavy oil, pipelines, and gas storage facilities, with a 100% success rate.

The long-distance interception of magnetic-steering drilling technology successfully connected seven-inch fiberglass casings to meet the Coal Seam Interception requirements of trajectory monitoring and control at the Qinshui coalbed methane field.

The trenchless magnetic-steering tools set a new domestic distance record with a 2520-metre pipeline crossing, and won the National High-quality Project Gold Award in the Sino-Russia East Line Pipeline Project.

Passive magnetic guidance technology made the breakthrough from "0" to "1" at the Jilin Oilfield, pioneered the first successful global magnet beacon free "cement plug type" blockage in old wells, and set multiple records in the most complicated domestic fishing and dual non-trackable blockage operations.

The breakthrough in the depth and range of domestic buried wellhead ranging provided concrete support in the newly incremental working gas volume of 5.695 billion cubic metres in underground gas storage.

中国石油集团工程技术研究院有限公司MGD磁导向钻井技术与工具荣获cippe2023展品创新金奖

第二十三届中国国际石油石化技术装备展览会如期在北京举行，大会专家评审委员会从1800多家参展商近万种展品中评选出“MGD磁导向钻井技术与工具”，荣获本届“cippe展品创新金奖”。

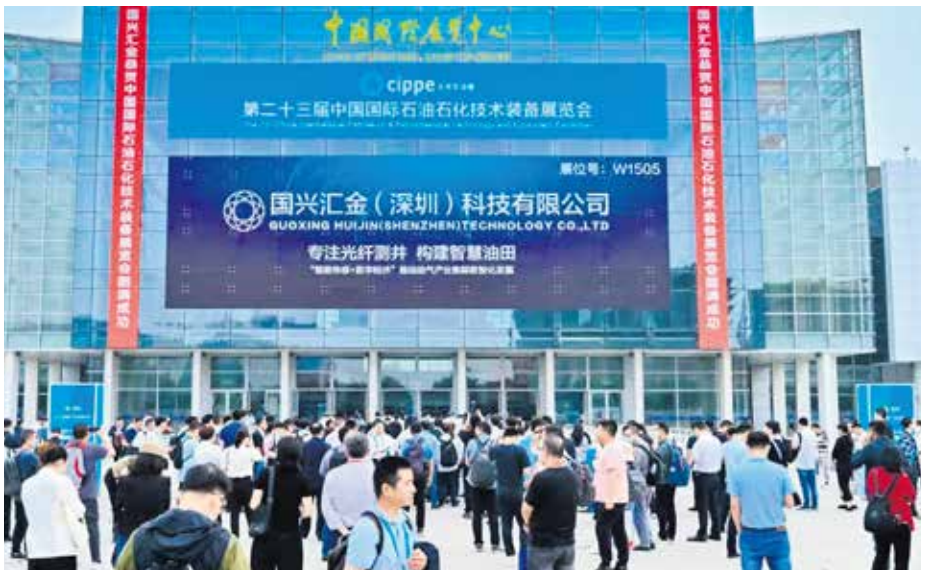
MGD磁导向钻井技术与工具，是由中国石油集团工程技术研究院有限公司联合国内六家单位研发，完全具有知识产权的一种高精度井眼轨迹定位技术。该技术主要通过实时获取数千米井下旋转永磁体、交变电流、磁性套管等产生的人工磁场分布特征，结合磁导向理论模型创建，实现对相邻井眼空间位置的“厘米级”高精度导航。在数千米地下探测及对接应用中的技术实现难度和精准程度堪比航天空间站对接工程。

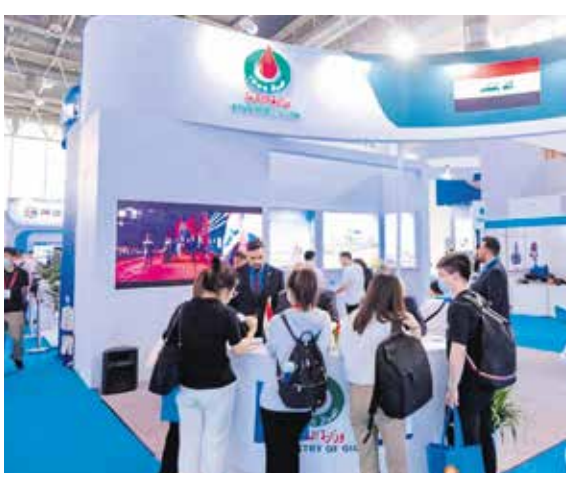
该技术与系列工具已获授权专利33件，软件著作权5项，发表论文27篇，专著4部，制订技术规范5项，核心成果先后获省部级奖9项，经由中国石油和化工联合会院士、专家组评审鉴定认为该成果整体达到国际先进水平，其中关键技术指标处于国际领先。

cippe2023 同期活动日程安排
cippe2023 Concurrent Events Schedule

	时间 TIME	地点 VENUE	主题 EVENT TOPICS	主讲企业 SPEAKER
1 June	09:10-12:00	W-103会议室 Conference Room W-103	首届石油技术与装备院校长论坛暨第十五届国际石油天然气产业大会-测控技术分论坛 The First Presidents Forum of Petroleum Technology and Equipment Institutes & The 15th International Petroleum & Natural Gas Conference - Measurement and Control Technology Session	中国国际石油石化技术装备展览会 (cippe) 组委会 中国石油大学（北京） China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee China University of Petroleum
	09:10-12:00	W-104会议室 Conference Room W-104	首届石油技术与装备院校长论坛暨第十五届国际石油天然气产业大会-油气装备技术分论坛 The First Presidents Forum of Petroleum Technology and Equipment Institutes & The 15th International Petroleum & Natural Gas Conference - Oil & Gas Equipment and Technology Session	中国国际石油石化技术装备展览会 (cippe) 组委会 中国石油大学（北京） China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee China University of Petroleum
	09:10-12:00	W-201会议室 Conference Room W-201	首届石油技术与装备院校长论坛暨第十五届国际石油天然气产业大会-新能源分论坛 The First Presidents Forum of Petroleum Technology and Equipment Institutes & The 15th International Petroleum & Natural Gas Conference New Energy Session	中国国际石油石化技术装备展览会 (cippe) 组委会 中国石油大学（北京） China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee China University of Petroleum
	09:00-16:30	E-206/207/208/209 会议室 Conference Room E-206/207/208/209	2023国际石油石化技术会议 International Petroleum and Petrochemical Technology Conference 2023	西安石油大学 陕西省石油学会 北京振威展览有限公司 Xi'an Shiyou University Shaanxi Petroleum Society Beijing Zhenwei Exhibition Co., Ltd.
	09:20-15:40	展馆 Exhibition Hall	cippe2023企业新产品新技术推介会 cippe2023 Enterprise New Product and New Technology Promotion Conference	中国国际石油石化技术装备展览会 (cippe) 组委会 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee
	09:30-16:30	中心餐饮区 二层西花园会议室 West Garden Conference Room, Central Dinning Area, 2nd Floor	cippe2023石油院校技术成果交流会 cippe2023 Universities Exchange Conference on Oil & Gas Research Achievements	中国国际石油石化技术装备展览会 (cippe) 组委会 北京振威展览有限公司 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Beijing Zhenwei Exhibition Co., Ltd.
	09:30-16:30	展馆 Exhibition Hall	探馆直播 cippe Discoveries Livestream	中国国际石油石化技术装备展览会 (cippe) 组委会 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee
	09:30-12:00	W3馆Matching区 W3810 W3 Matching Zone W3810	中国-阿根廷石油天然气及能源洽谈会 Argentina-China Oil, Gas and Energy Matchmaking Meeting	中国国际石油石化技术装备展览会 (cippe) 组委会 北京振威展览有限公司 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Beijing Zhenwei Exhibition Co., Ltd.
	09:30-11:30	W-102会议室 Conference Room W-102	2023国际天然气和城市燃气高峰论坛 2023 International Natural Gas and City Gas Summit	北京振威展览有限公司 Beijing Zhenwei Exhibition Co., Ltd.
	10:00-16:30	W1馆Lucky区W1280 W1 Lucky Zone W1280	幸运石油人 Lucky Oilman	中国国际石油石化技术装备展览会 (cippe) 组委会 北京振威展览有限公司 China International Petroleum & Petrochemical Technology and Equipment Exhibition (cippe) Organizing Committee Beijing Zhenwei Exhibition Co., Ltd.
	10:00-11:00	E-203会议室 Conference Room E-203	达坦石油云 Tartan Petrol Intelligent Cloud	上海达坦能源科技股份有限公司 Shanghai Tartan Energy Technology Co., Ltd. 虞绍永教授，达坦首席油藏科学家、软件研发总监 Yu Shaoyong, Chief Reservoir Scientist & Software R&D Director of Tartan Group
	13:30-16:00	W3馆Matching区 W3810 W3 Matching Zone W3810	中国石化海工锻件技术发展与供需对接会 China Forgings Supply and Demand Fair for Petroleum, Petrochemical and Ocean Engineering	中国锻造进出口联盟 China Forging Alliance for Import & Export
	13:30-15:00	W-103会议室 Conference Room W-103	北美防爆认证要求综述及其与ATEX和IECEx认证对比 A Comprehensive Overview of the Ex Product Certification Schemes in North America and How They Compare to ATEX and IECEx	CSA集团 CSA Group 王先生，中国防爆团队技术总监 Tom Wang, Technical Team Lead, China Hazloc Unit
	13:00-16:30	W-201会议室 Conference Room W-201	2023海上风电船舶产业链发展论坛 Offshore Wind Power Ship Industry Chain Development Forum 2023	中国船舶工业行业协会 China Association of the National Shipbuilding Industry (CANSI)
2 June	09:00-12:00	E-206/207/208/209 会议室 Conference Room E-206/207/208/209	2023国际石油石化技术会议 International Petroleum and Petrochemical Technology Conference 2023	西安石油大学 陕西省石油学会 北京振威展览有限公司 Xi'an Shiyou University Shaanxi Petroleum Society Beijing Zhenwei Exhibition Co., Ltd.
		注：以上活动日程或有调整，以展会现场公布为准。 Note: The final agenda will be announced by the Organizing Committee on-site		

Pictures from the show





Pictures from the show

CPTDC: A world-class comprehensive service provider for energy equipment and products

China Petroleum Technology Development Co., Ltd. (CPTDC) was established in 1987 and is a wholly-owned subsidiary of China National Petroleum Corporation (CNPC).

As the pioneer of China's overseas petroleum projects, CPTDC was the first to go abroad and become the overseas projects' main supplier of materials, equipment, and services.

Since its establishment, CPTDC has had a turnover of over $42.5 billion and expanded its business scope to 115 countries and regions worldwide.

It has become a specialized company engaged in the import and export of global energy equipment and energy products, and is renowned in the industry.

Thanks to China's strong production technology and manufacturing capabilities, CPTDC is able to establish a comprehensive supply chain management and service system globally.

It has established 17 warehousing, consignment, production, operation and maintenance facilities in 14 countries, which allow CPTDC to provide customers with a strong full process service guarantee.

With plentiful experience in trans-national, multi-modal transportation, CPTDC designs specialized logistics solutions for customers, providing "door-to-door" and "one-stop" full supply chain services.

Through solid services, CPTDC has been able to maintain long-term friendly cooperative relationships with more than 4000 enterprises worldwide, and enjoys a positive image and commercial reputation.

To actively integrate into the new pattern of "dual circulation" development and implement the "dual transformation" strategy, CPTDC has established three main business lines: energy equipment; petrochemical business; and industrial and civilian products.

Its energy equipment business includes geophysical exploration, drilling, oil production, power, marine engineering, refining, and petroleum pipes.

The petrochemical business includes bulk energy products, catalysts, synthetic rubber, psynthetic fibers, paraffin, fertilizers, synthetic resins, liquid chemical raw materials and oilfield chemistry.

The industrial and civilian products business includes industrial energy products, steel and iron ore, non-ferrous metals, agricultural products, forestry products, food and daily consumer goods, automobiles and spare parts, etc.

The company strives to create a trade pattern that fully covers import and export, as well as domestic and foreign trade, to provide the highest quality service and comprehensive solutions to global customers, and strive to practice the principle of "where there is energy, where there is demand, there is CPTDC."

Booth: E1300

CPTDC——建设世界一流的能源装备和能源产品综合服务商

中国石油技术开发有限公司(以下简称CPTDC展位号：E1300)成立于1987年，是中国石油(CNPC)的全资子公司。作为中国石油海外先行军，CPTDC第一个走出国门，成为中国石油海外项目物资装备及服务的供应主体。

CPTDC依托中国强大的生产技术和制造能力，在全球建立了完善的供应链管理和服务体系，在14个国家建立了17处仓储寄售、生产运维设施，为客户提供强有力的全流程服务保障。

斯伦贝谢携GeoSphere 360等展品亮相cippe2023

GeoSphere 360技术是油藏随钻描绘的巅峰之作，也是斯伦贝谢(展位号：E1205)今年将推向市场的一系列数字化技术和服务中的第一项。与传统技术不同的是，在实钻过程中，3D随钻油藏描绘技术可以在储层尺度上识别流体边界和断层。这是一种变革性的数字技术能力，可以推动强化储层认识，优化地质导向，提高单井储量控制和产量，并增强油田开发决策能力。

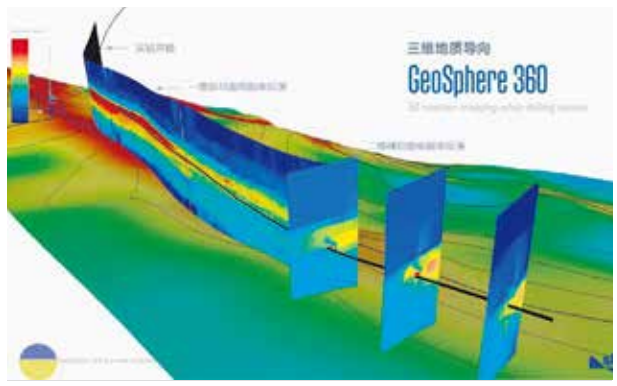
储层尺度的地质建模可以提供储层的构造、地层和岩性特征的三维表征，提高了地质导向的信心和成功率。

SLB showcases GeoSphere 360 and other exhibits at cippe2023

GeoSphere 360 service is the pinnacle of reservoir mapping while drilling and the first in a series of digitally enabled technologies and services that SLB will bring to market this year.

"Unlike conventional technologies, 3D reservoir mapping while drilling identifies fluid bodies and faults — at a volumetric reservoir scale — which is unique in the industry," said Jesus Lamas, president, Well Construction.

"This is a transformative digital capability that drives improved reservoir understanding, optimized well placement, increased reserves bookings and production per well, and enhanced field-development decision making."



Geomodeling at the reservoir scale delivers 3D characterization of structural, stratigraphic and lithographic features of the reservoir, which increases geosteering confidence.

The GeoSphere 360 service uses a unique combination of advanced cloud and computing solutions and digitally enabled hardware to acquire 3D electromagnetic data.

This data is contextualized in real time to improve the understanding of resistive reservoir bodies and reservoir dynamics, contributing to better field development planning.

The GeoSphere 360 service has undergone extensive field testing in various environments globally.

In the Middle East, an operator leveraged the GeoSphere 360 service for real-time 3D mapping of sand channel bodies, resulting in optimal well placement and maximum reservoir exposure.

In North America, an operator used the 3D reservoir mapping-while-drilling service to characterize structural and stratigraphic features of a reservoir, providing seismic scale understanding that led to optimized field development planning.

A North Sea operator used the GeoSphere 360 service to integrate data from multiple scales of measurements, enabling strategic geosteering decisions that helped reduce uncertainties, maximize well placement and optimize production potential.

Since its introduction, the SLB Rotary Steerable System has pursued automation to improve drilling efficiency.

In 2003, SLB pioneered the automatic vertical drilling system, which set the industry benchmark for this type of technology.

The subsequent Inclination Hold and Hold Inclination & Azimuth technology also greatly simplifies the drilling process in the holding section and horizontal section.

In 2021, SLB broke through the last and hardest part of directional automation: the curve section, paving the way for the system-wide automatic directional drilling.

Booth: E1205

HEICO looks forward to greeting you at Booth W2410

Founded in Germany in 1900, HEICO group has developed to a leading provider of high quality solutions with subsidiaries in 13 countries.

HEICO-LOCK® wedge locking systems meet the DIN25201-4 standard, which can effectively secure bolt connections.

Using tension instead of friction distinguishes the systems from traditional methods.

The systems work at low and high preload levels including when using lubricants, very easy to be installed, removed and re-used.

HEICO-TEC® tensioning systems meet the requirements of ISO 898 and so can replace any conventional nut and bolt with same strength.

A hand-held torque wrench is all needed. Confirmed by DNV GL, it guarantees repeatable tightening accuracy better than +/-5%.

Booth: W2410

海阔紧固件诚邀您莅临W2410展位

1900年，HEICO创建于德国，迄今在全球13个国家设有分支机构。100多年来，HEICO秉承精益求精的态度，不断优化生产工艺，自主设计和研发生产设备，以确保优异的产品质量。

HEICO-LOCK®楔入式防松系统是极少数能有效防松的安全技术之一，符合DIN 25201-4的严苛要求。该系统的首要特点是通过夹紧力而非摩擦力来防止螺栓松动，和现有的其它防松方式截然不同，防松效果不受润滑影响，预紧力可控，且极易安装和拆卸，可重复使用。

Changchun Green Drive: Provider of green power conversion solutions

Changchun Green Drive Hydrogen Technology Co., Ltd. is a company controlled by SPIC Hydrogen Energy Tech.

Since its establishment, Changchun Green Drive has focused on the research and promotion of hydrogen production by PEM electrolysis, and is committed to providing customers with advanced solutions and core equipment for green power conversion.

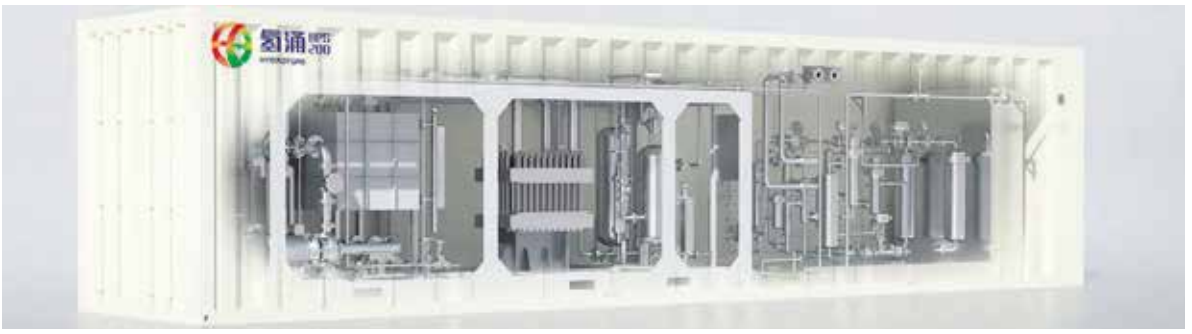
The "HYDROFORE" PEM electrolysis equipment independently developed by the company covers product specifications ranging from 100 kilowatts to 100 megawatts, and the overall technology has reached the leading level in China.

The active area size of the electrolytic cell, DC power consumption and other indicators have reached international advanced levels,.

It has also achieved commercial operation of megawatt level PEM hydrogen production equipment and a breakthrough in the volume for green power conversion projects.

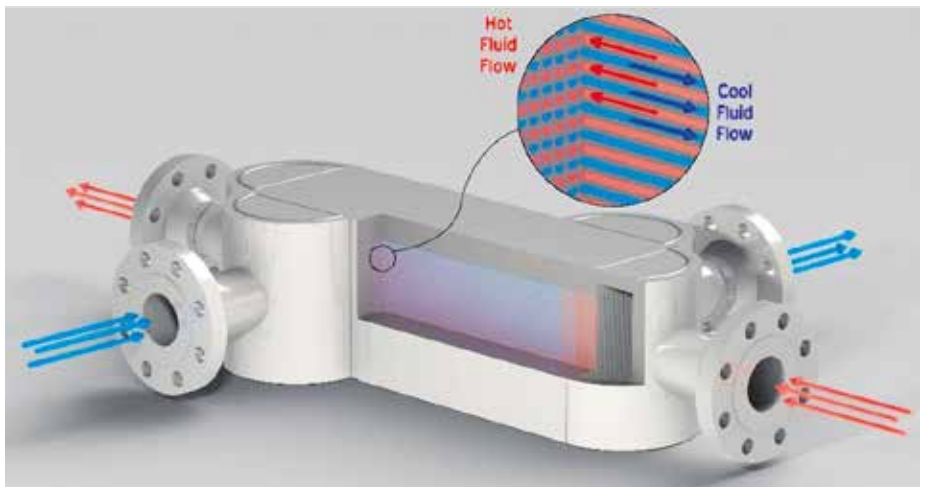
Changchun Green Drive will continue to increase investment in R&D, lead the development of green energy with scientific and technological innovations, and contribute to the energy revolution and "30-60" carbon peak and neutrality goals.

Booth: W4510



长春绿动——绿电转化解决方案提供商、电解水制氢系统供应商

长春绿动氢能科技有限公司（以下简称"长春绿动"展位号：W4510）成立于2021年，注册资金8亿元，由国家电投集团氢能科技发展有限公司控股。长春绿动自成立以来，专注于PEM电解水制氢技术的研究与推广，致力于为客户提供先进的绿电转化解决方案与核心装备。



Enthalpy specializing in micro-channel plate heat exchanger fabrication

Shanghai Enthalpy-Optimizing Energy Science and Technology Ltd. is a high-tech enterprise specializing in research, design and manufacture of micro-channel plate heat exchanger. Microchannel plate heat exchanger — also known as Printed Circuit Heat Exchanger (PCHE) — and aims to meet the needs of industry users to achieve high temperature and high pressure heat exchange in small volumes.

Since 2010, the company has paid close attention to the development of microchannel plate heat exchangers.

After many iterations, including as an evaporator, recuperator and heat exchanger, it has developed and produced nearly 100 kinds of micro-channel plate heat exchanger products for users in new energy, nuclear power, waste heat utilization, electronics and other industries to meet various working conditions.

Booth: W4811

益焓能源——专业生产微通道板式换热器

上海益焓能源科技有限公司(展位号：W4811）是一家专门从事微通道板式换热器研制、设计和生产制造的高新技术企业。微通道板式换热器，也称为印刷电路式热交换器 （PCHE），主要是为满足行业用户对在较小的体积内实现高温、高压换热的需求。

中船(邯郸)派瑞诚邀您莅临W4862展位

中船(邯郸)派瑞氢能科技有限公司是中国船舶第七一八研究所全资子公司,以七一八研究所六十余年在氢能领域的技术实力和工程经验为依托，是目前国内氢能装备产业链较为完备的科研生产企业，拥有2个省级研发平台，总建筑面积达21500平方米。

PERIC welcomes you to visit us at Booth W4862

PERIC Hydrogen Technologies Co., Ltd is a wholly-owned subsidiary of CSIC's Purification Equipment Research Institute of CSIC.

It is mainly engaged in the research, design, manufacturing of hydrogen generation system, as well as the utilization and research development of hydrogen energy.

The annual production capability is 350 sets of alkaline type hydrogen generator and 120 sets of PEM type hydrogen generator.

The PEM-type H2 generator is a green hydrogen generation system that has been developed by PERIC in recent years. The hydrogen generation capacity ranges from 0.01Nm^3/h to 300Nm^3/h.

Besides traditional industries, it can be applied to renewable energy hydrogen generation, hydrogen infrastructure systems for a hydrogen refueling station, natural gas mixed with hydrogen and so on, and can be widely used in transportation, power storage, intelligent micro-grid and other special fields.

The advantage of the PEM-type H2 generator is its use of pure water as an electrolytic solution, therefore having no pollution, being non-corrosive, and having greater hydrogen purity.

Compared with the alkaline-type H2 generator, it can be operated at high current densities, which can result in reduced operational costs and electrolytic efficiency of up to 85% or better.

This generator is compact and light weight, with operation and regulation ranging from 0% to 100%, with higher reliability and lower maintenance cost.

The main products of PERIC also include skid-mounted H2 generators, containerized-type H2 generators, skid-mounted hydrogen fueling stations and hydrogen generation systems using methanol cracking.

Booth: W4862

Hydrexia Energy: China's leading integrated hydrogen technology solution provider

氢枫能源——国内领先的氢能综合技术方案提供商

北京氢枫能源技术有限公司为上海氢枫能源技术有限公司（氢枫能源 展位号：W4426）子公司。氢枫能源为国内领先的氢能综合技术方案提供商，拥有全球化视野，专注于提供氢能生产、储存、运输和应用的全产业链产品及服务。集团依托行业领先技术及强大研发实力，旨在有效解决全球氢能生态系统的技术和应用需求。

Hydrexia Energy Technology is a leading integrated hydrogen technology solution provider in China with extensive global reach.

The company specializes in providing technology solutions for hydrogen production, storage, distribution, and utilization.

Leveraging its solid R&D capabilities and industry-leading technology, Hydrexia aims to effectively address the technology and application needs in the global hydrogen eco-system.

As an integrated Hydrogen technology solution provider, Hydrexia is committed to serving the needs of the Hydrogen industry chain. To date, the company has grown its business presence to various global markets including Australia, Singapore, Malaysia, Thailand, Vietnam, Russia, and the U.S.

FABRICATION

Chinese yards swamped with FPSO orders

Wind installation vessel bookings also up sharply as country captures larger share of construction market

Departure: Cosco delivered the FPSO for BP's Greater Tortue Ahmeyim LNG project offshore Mauritania and Senegal earlier this year. Photo: TECHNIP ENERGIES

XU YIHE
Houston

THE fabrication business for floating production, storage and offloading vessels, long dominated by Singapore and South Korea, has established a strong foothold in China, where the wide availability of lower-cost labour and markedly improved engineering and yard capacities have been a boon to local yards.

Chinese shipyards are packed with orders for FPSOs destined for Brazil and Guyana as they are now better positioned than most of their Asian counterparts to respond to subcontracting requirements offered by leading engineering, procurement and construction contractors such as Modec of Japan and SBM of Holland.

Last year, Chinese yards continued to outshine their Asian competitors to land high-profile FPSO orders after having forged long-term alliances with foreign EPC contractors.

A recent Rystad Energy study shows that Chinese yards now take 79% of the global market share for FPSO hulls, 49% of topsides and 44% of hull-topsides integration.

Led by Cosco Shipping Heavy Industry and CIMC Raffles, 10 yards in China are now building or completing 19 FPSO projects, while Singapore has a backlog of six and South Korea has three.

Among the most recent deals is a contract offered by Singapore's Sembcorp Marine to Cosco for EPC work on the hull and living quarters for the P-82 FPSO for deployment offshore Brazil, with topsides fabrication and integration to be carried out by Sembmarine.

China is also emerging as the supply chain powerhouse for offshore wind, with increasing amounts of yard space dedicated to building offshore wind turbine installation vessels (WTIVs) and offshore support vessels.

According to a recent report by ship broker Clarksons, the demand for offshore wind vessels will spur over $26 billion in capital spending between now and the end of 2028, including $21 billion for about 70 WTIVs and a further 90 OSVs costing $5 billion.

Unlike its FPSO construction business, China is a relatively closed market for WTIVs, driven by its own domestic demand.

And as China's wind farms move into deeper water farther from shore, more powerful and high-specification WTIVs are in demand. The country's flagship offshore wind player China Three Gorges Corporation (CTG) recently put into service China's first 2000-tonne offshore wind farm installation vessel Baihetan, which has a full load displacement with total capacity of 37,000 tonnes and integrates functions such as transport, self-elevation, self-propulsion and dynamic positioning.

The vessel is able to lift cargo as heavy as 2000 tonnes and work in water depths up to 70 metres.

In addition to domestic orders, yards led by CIMC Raffles, Cosco and China Merchants Heavy Industry are increasingly seeing demand from foreign offshore wind contractors.

Cosco recently clinched an order from Danish WTIV owner and operator Cadeler to build an F-class jack-up rig catering to the largest offshore wind projects in the industry.

The $345 million contract carries an option for Cosco to construct an additional X or F-class jack-up vessel.

With deck space of 5600 square metres and a payload of more than 17,600 tonnes, Cadeler claims the X and F-class vessels will be able to transport and install seven complete 15-megawatt turbine sets per load, or five sets of 20 megawatts or greater turbines.

The F-class vessel specifications also suggest it will be able to transport up to six very large monopiles weighing 2300 to 2600 tonnes each per round trip.

Late last year, CIMC Raffles cut the first steel for Norwegian offshore wind services company Havfram's first WTIV, which is capable of installing 300-metre tall, 3000-tonne turbines in water depths of up to 70 metres.

In addition, CIMC Raffles is on schedule to deliver China's largest WTIV late this year.

Capable of installing wind turbines of up to 20 MW, the vessel is designed for installations in rough seas.

The dynamically positioned vessel is designed to work in water depths up to 65 metres, although this can be increased to about 80 metres if the jack-up legs are lengthened from 120 metres to 136 metres.

This vessel will be equipped with a Huisman heavy-lift crane with a capacity of 2200 tonnes, and a rack-and-pinion jacking system able to operate in waves of up to 2.5 metres.

中国船厂海工订单丰满，FPSO工作量加大

长期以来由新加坡和韩国主导的FPSO制造业已在中国建立了稳固的立足点，在中国，低成本劳动力、健全的供应链以及工程建造能力显着提高了船厂获得项目的能力。

中国造船厂挤满了运往巴西和圭亚那的FPSO 订单，它们现在比大多数亚洲同行更能应对日本Modec和荷兰SBM等领先的工程、采购和施工承包商提出的分包要求。Rystad Energy 最近的一项研究表明，中国船厂目前占据 FPSO 船体全球市场份额的79%、上部模块市场份额的49%和集成市场的44%。

在中远海运重工和中集来福士的带领下，中国10个船厂目前正在建造或完成19个FPSO项目，而新加坡有6个积压，韩国有3个。

中国也正在成为海上风电供应链的强国，越来越多的船厂将设施提供给建造海上风力涡轮机安装船 (WTIV) 和海上支持船。

Clarksons最近的一份报告指出，从现在到2028年底，对海上风力船的需求将刺激超过 260 亿美元的资本支出，其中包括用于约70艘WTIV的 210亿美元和另外90艘耗资50亿美元的OSV。

与其FPSO建造业务不同，中国是一个相对封闭的WTIV市场，受其自身国内需求的驱动。

除了国内订单，以中集来福士、中远和招商局重工为首的船厂越来越多地看到来自国外海上风电承包商的需求。

中远最近从丹麦WTIV的所有者和运营商Cadeler那里获得订单，建造一座F级自升式钻井平台，以满足业内最大的海上风电项目的需求。

去年底，中集来福士为挪威海上风电服务公司Havfram的第一台WTIV切割了第一块钢材，该WTIV能够安装300米高、3000吨的涡轮机，水深可达70米。

此外，中集来福士按计划将于今年晚些时候交付中国最大的WTIV。该船能够安装高达20兆瓦的风力涡轮机，在65米的水深下工作。

RENEWABLE ENERGY

Afloat: CNOOC is working with Three Gorges to develop offshore wind facilities. Photo: WISON

Offshore wind sector gathers momentum

Country brought an additional nine offshore wind farms on stream last year with total capacity of 3.8 GW — nearly half the world's total in 2022

XU YIHE
Houston

CHINA'S offshore wind sector continued to ride high in 2022, boosted by a programme of government subsidies that wrapped up at the end of 2021.

A recent Clarksons report shows that as of early this year, China has put 114 offshore wind farms on the grid, involving 5700 turbines with total capacity of 28.6 gigawatts — twice the capacity of the UK, its closest rival in installed wind capacity.

China's National Energy Administration says the capacity is actually 30.46 GW.

Of the 114 offshore wind farms, nine were put on stream last year, comprising 507 turbines with total capacity of 3.8 GW, accounting for 47% of the total offshore wind capacity put online worldwide in 2022.

Another 35 offshore wind farms are under development offshore China with a total 15.9 GW capacity, which is about 46% of the total offshore wind farms currently being built worldwide.

Carbon storage projects for industrial clusters moving ahead

Even though China operates only one floating offshore wind farm, another five are under development with capacity of 234 megawatts, two of which will incorporate turbines of 16 MW, the world's largest.

Chinese offshore wind giant China Three Gorges has begun a trial run of the country's maiden floating wind project, the 400 MW Yangxi Shapa 3 wind farm offshore Yangjiang City in Guangdong province.

One of the floating wind projects is being developed by China National Offshore Oil Corporation, which will soon install the country's first deep-water floater for an offshore wind farm in the South China Sea's Beibu Gulf.

The floater, billed as Haiyou Guanlan, is equipped with a 35-metre central column flanked by three side columns and will be installed in water depths of 120 metres about 136 kilometres offshore Yangjiang city.

The facility incorporates a 7.25 MW turbine to be provided by Shanghai Electric. The 22 million kilowatt hours of electricity to be generated per annum from the floating wind farm will be sent via a 136-kilometre cable to the Wenchang oil complex in the South China Sea, helping to cut carbon dioxide emissions by 22,000 tonnes per annum, the operator says.

Chinese government officials and offshore wind specialists have just given the go-ahead to a feasibility study for a project in southern China's Hainan province that could become the country's first commercial offshore floating wind farm.

The study involves the first phase of the wind farm project, which will be installed offshore Wanning city and have a total capacity of 1 GW per annum.

The first phase covers facilities for a 200 MW offshore wind farm in an area of 233 hectares, 20 kilometres southwest of Wanning.

Phase one will come online in 2025, with the 800 MW second phase due on stream in 2027.

When completed in 2027, the project will be able to generate 4.2 billion kilowatt hours per annum of electricity. Jiangsu province in eastern China leads the country's offshore wind development, currently accounting for 41% of China's total offshore wind power generation capacity.

Guangdong province in the south is working hard to catch up: of the total new offshore power generation capacity, 30% is located in Guangdong, according to the report.

Chinese turbine fabricators, such as Shanghai Electric, lead the world in research and development of large offshore wind turbines. Turbines with capacity of up to 18 GW are being built and those of 20 GW and beyond are under research and development.

The number of offshore wind installation vessels in China rose 13.3% last year to 290 units, but the average utilisation rate dropped to 63%, down from 2021's 92%, the report said.

Chinese yards signed contracts last year to build 20 offshore wind installation vessels, five heavy lift vessels and nine offshore wind farm maintenance vessels.

中国海上风能行业正在蓄势待发

虽然2021年底政府结束了补贴计划，中国的海上风电行业在2022年继续保持高位。

克拉克森最近的一份报告显示，截至今年年初，中国已将114个海上风电场并网，涉及5700台涡轮机，总装机容量为 28.6 吉瓦——是装机容量最接近的英国的两倍。国家能源局称，实际装机容量为 30.46 吉瓦。

在114个海上风电场中，去年有9个投产，包括507台涡轮机，总容量3.8吉瓦，占2022年全球海上风电总容量的47%。

中国海上还有35个正在开发的海上风电场，总装机容量为15.9吉瓦，约占目前全球在建海上风电场总数的46%。

尽管中国只有一个海上浮式风电场，但另外五个正在开发中，容量为234兆瓦，其中两个将配备世界上最大的16兆瓦涡轮机。

另外，中国刚刚批准了中国南部海南省一个项目的可行性研究，该项目可能成为中国第一个商业海上浮动风电场。

该研究涉及风电场项目的第一阶段，该项目将安装在万宁市近海，总容量为每年 1吉瓦。2027年建成后，项目年发电量将达42亿千瓦时。

江苏引领全国海上风电发展，目前占中国海上风电总装机容量的41%。广东省正在努力追赶：报告称，在海上新增发电能力总量中，30%位于广东省。

上海电气等中国风机制造商在大型海上风电机组的研发方面处于世界领先地位。正在建造容量高达 18 GW 的涡轮机，而 20 GW 及以上的涡轮机正在研发中。

报告称，去年中国海上风电安装船数量增长 13.3% 至 290 艘，但平均利用率从 2021年的 92% 降至 63%。

中国造船厂去年签署了建造20艘海上风电安装船、5 艘起重船和 9 艘海上风电场维护船的合同。